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Zuweisende bewerten die Qualität ambulanter Radiologie-Institute:

Entwicklung und pyschometrische Evaluation eines Fragebogens

Referrers Assessing the Quality of Outpatient Diagnostic Imaging Services: Development and Psychometric Evaluation of a Questionnaire

Abstract

Goal: In order to ensure high-quality cooperation between referring physicians and imaging services, it is important to assess quality of imaging services as perceived by referring physicians. The present study aimed at developing and validating a questionnaire for referrers assessing the quality of outpatient diagnostic imaging services.

Material & Methods: The questionnaire was developed on the basis of an instrument originally generated by the Professional Associations of German Surgeons. After pretesting, the instrument was fielded with physicians referring to four outpatient diagnostic imaging services in Switzerland. The results were assessed using descriptive statistics and the final instrument was tested for validity using the concept of known-groups validity. The underlying hypothesis was that physicians referring frequently to services estimated the quality of these services to be higher than physicians that referred less often to the services. The final questionnaire was tested for internal consistency and reliability.

Results: Results show a high level of satisfaction of referring physicians with with a total mean score over all items of 4.5 on a 5-point Likert scale but also potential for quality improvement initiatives can be found. The psychometric evaluation of the final questionnaire shows that it is a valid instrument, showing that high-frequency referrers were significantly more satisfied than low-frequency referring physicians with total mean scores of 4.6 compared to 4.4 (p-value 0.019). Further, the instrument proves to be consistent and reliable with a Cronbach's Alpha of 0.96 (95% CI 0.95-0.97).

Conclusions: The final instrument presents a valid, consistent and reliable option to assess quality of outpatient diagnostic imaging services as perceived by referring physicians. Results can be used as a basis for quality improvement.

Key Points

- A newly developed questionnaire assesses quality of outpatient diagnostic imaging services as perceived by referring physicians. The questionnaire was developed and fielded in Switzerland.
- Differences between high- and low-frequency referrers were of 0.2 (p-value 0.019) points on a five-point Likert scale. Cronbach's Alpha was of 0.96 (95% CI 0.95-0.97).
- Results are of interest for imaging services as well as for initiatives encompassing several services

Zusammenfassung

Ziel: Um die Qualität der Kooperation zwischen Zuweisenden und Radiologie-Instituten zu verbessern, ist die Einschätzung der Qualität der erbrachten Leistung seitens der Zuweisenden essentiell. Die vorliegende Studie hat das Ziel, die Entwicklung und Validierung eines Fragebogens, mittels dessen Zuweisende die Qualität ambulanter Radiologie-Institute einschätzen, zu beschreiben.

Material & Methoden: Der Fragebogen wurde auf der Grundlage eines bestehenden Instrumentes entwickelt, welches diskutiert und modifiziert wurde. Der neu entstandene Fragebogen wurde einem qualitativen Pre-Test unterzogen und anschliessend bei Ärzten, die Patienten an ambulante Radiologie-Institute in der Schweiz zuweisen, erstmals eingesetzt. Die Resultate wurden mittels deskriptiver Statistik analysiert. Das finale Instrument wurde bezüglich seiner Validität mittels des "Known-Groups"-Konzepts getestet. Diesem Verfahren unterliegt die Hypothese, dass Ärzte, die häufig Patienten an ein Institut überweisen, mit diesem Institut eher

zufrieden sind, als Ärzte, die selten Patienten an dieses Institut überweisen. Differenzen in der Bewertung wurden mittels eines einseitigen Wilcoxon-Tests für zwei Samples gemessen. Das finale Instrument wurde mittels Cronbach's Alpha bezüglich seiner internen Konsistenz und Reliabilität gemessen.
Resultate: Die Resultate zeigen, dass die Zuweisenden generell sehr zufrieden sind mit der Arbeit der Radiologie-Institute, die Antworten weisen aber auch auf Verbesserungspotential hin. Die psychometrische Evaluation des finalen Instruments zeigt, dass dieses valide ist, da es signifikante Differenzen zwischen den Einschätzungen von häufiger und weniger häufig Zuweisenden Ärzten zeigt. Zudem ist das finale Instrument konsistent und reliabel.
Schlussfolgerung: Das finale Instrument ermöglicht eine valide, reliable und konsistente Überprüfung der Einschätzung der Qualität ambulanter Radiologie-Institute durch ihre Zuweisenden. Die Resultate können als Grundlage für Qualitätsverbesserung genutzt werden.

Kernaussagen

- Ein neu entwickelter Fragebogen misst die Qualität ambulanter Radiologie-Institute aus der Sicht der Zuweisenden. Der Fragebogen wurde in der Schweiz entwickelt und pilotiert.
- Auf einer 5 Punkte Likert Skala betrugen die Unterschiede zwischen häufig und selten Überweisenden 0.2 Punkte (p-Wert 0.019). Cronbachs Alpha betrug 0.96 (95% CI 0.95-0.97).
- Die Resultate sind sowohl für Radiologie-Institute als auch für Initiativen, die über einzelne Institute hinausgehen, von Interesse.

Key words

- Outpatient service
- Radiology
- Referral and Consultation
- Psychometrics
- Surveys and Questionnaires

Introduction

In times of highly fragmented healthcare services, cooperation between various providers in the sector is regarded as one key factor to ensure high quality of care [1]. Gathering reliable data on the quality of specialists' services as perceived by referrers can yield important information allowing to assess and improve services as well as cooperation on an organizational level and beyond.

Concerning imaging services, a number of studies and questionnaires have proposed to assess referrers' satisfaction with and opinion about quality of imaging services. They evaluate quality in general [2], focus on certain imaging subspecialties [3, 4, 5, 6] or concentrate on reporting of results [7, 8, 9]. However, based on literature research as well as on information given by the European Society of Radiology, validated questionnaires assessing referring physicians' opinion on quality of imaging services are lacking.

On the contrary, the question which aspects of quality are of special importance to referrers and determine the decision to choose a specialist provider have been intensively discussed. Not surprisingly, most research reveals that a referrers' perception of a specialist's medical skills is an important criterion. In addition to that, previous positive experiences, patients` feedback as well as communication with the specialist are very important elements for referrers [10, 11, 12, 13, 14, 15, 16, 17]. Communication includes talking or writing about organizational aspects such as scheduling of appointments, and medical aspects such as specialists' response by letter or phone. Institutional and medical quality appear to be tightly linked to each other. Positive experiences are the basis for sustainable relationships between referrers – and vice versa, with personal contacts providing an opportunity to ask medical questions [18]. This is also shown by Hackl et al. [19] who report that referrals within a doctor's personal network are more appropriate in terms of patient

outcomes than referrals outside the network, demonstrating that personal connections reduce information asymmetry on the specialists' abilities, meaning that referrers are better able to evaluate the specialists' competences and their limits. In summary, measuring referrers' satisfaction with imaging service is crucial to improve the quality of care provided.

The aim of the present study was to develop and validate a questionnaire for referring physicians that measures their judgments on the quality of care provided by outpatient imaging services.

Materials and Methods

Questionnaire development

The designing of the questionnaire was part of a broader initiative. This initiative brought together personnel of several imaging services with quality experts. In a participatory project, standards for infrastructures, patient and referrer management, teamwork and quality development. The initiative and the development of the questionnaire was organized by XXX.

A survey instrument originally generated by the Professional Association of German Surgeons, unpublished but distributed to referrers of specialists in Germany and Switzerland by XXX and XXX was used as basis for the development of the questionnaire. The original instrument was discussed and modified within a group of radiologists, radiographers, referring physicians and experts in order to draw a first version specifically addressing referrers of outpatient imaging services.

After that, the questionnaire underwent a qualitative pre-test [20] with two general practitioners and two specialists and was adapted accordingly. After a final discussion of the pre-test results with experts and referring physicians a last modification of the questionnaire was executed. Thereafter, the instrument was fielded.

The questionnaire included 24 items organized in several sections. Four items were summarized under the topic of “professional knowledge and skills”. Referrers’ satisfaction with the services’ contribution to integrated care as well as radiologists’ reports were represented by five items. Another seven items assessed the referrers’ impressions about the treatment of patients by radiology services and the final three items were subsumed under the topic “service”. All items assessing the quality of imaging services used a 5-point Likert response scale ranging from “strongly disagree with this statement” to “strongly agree with this statement”. Referring

physicians were also asked to provide demographic data, namely their field of specialization, the number of years since their state examination, as well as the frequency of referring patients to imaging services.

Sample and Procedures

The questionnaire was fielded as online survey and invitations for participation sent to 448 referring physicians of four radiology outpatient imaging services in the German-speaking part of Switzerland. Referrers' addresses were provided by the participating services. Recipients were asked to complete the questionnaire within two weeks. Participation was voluntary and anonymous. Referring physicians who had not answered within a two-week period received a reminder.

Statistical Methods

Descriptive statistics (means, distributions, missing answers) assessed the quality and distribution of data. An individual mean score was calculated for each respondent by aggregating all item ratings. Total mean scores and their corresponding distributions were calculated as the overall mean scores and distributions of the individual mean scores.

We examined known-groups validity [21]. Based on the evidence presented above, we hypothesized that high-frequency referrers estimate the quality of radiology services to be higher than low-frequency referrers do. High-frequency referrers are obviously satisfied with the service provided when they have, as it is the case in Switzerland, free choice of specialists. At the same time, frequent referrals enhance the quality of imaging services by stabilizing communication and contacts [19]. The concept of known groups validity expresses that a questionnaire claiming content

validity should be designed to and reproduce such well-established differences (for a similar procedure see [22,23]).

Differences were analysed using a one-sided two-sample Wilcoxon test (Mann-Whitney test) [24, 25]. P values <0.05 were regarded statistically significant.

Even though the study was not designed to have the power to show differences at item level, these were also assessed in order to gain insights about which quality criteria prove to be especially discriminative.

Internal consistency and reliability were measured with Cronbach's Alpha [26]. This measure can be viewed as the expected correlation of two tests measuring the same construct, varying between 0 and 1. A value of > 0.7 was assumed as being sufficient. All analyses were performed with the Open Source Software R, Version 3.4.3 from 2017 [27].

Results

In total, 148 questionnaires were returned, resulting in a return rate of 33% (148/448). Ten questionnaires were excluded as respondents only filled in demographic data and did not further proceed through the questionnaire. Thus, the corrected return rate was 31% (138/448). Table 1 summarizes characteristics of the study sample. Most of the referring physicians held a specialization in general internal medicine and had completed their approbation more than 21 years ago. Sixty-four percent (89/138) of the participants usually refer patients to the imaging services at least once a week, while thirty-six percent (49/138) have a lower referral frequency to radiology services (Table 1).

Descriptive Statistics

Six items were deleted from the final survey instrument, due to excessive missing answers and lacking discriminatory potential. These were items asking about the counselling for choosing examinations, taking over the right amount of responsibility and the collaboration between radiologists and their colleagues. Further three reverse-coded items were deleted, concerning the consent of patients to examinations, the handling of confidential data and the patient's rights, as they showed untypical distributions, pointing to a high frequency of confusion of the lower and higher end of the scale. The mean scores of these items ranged between 4.2 and 4.7 on a five-point Likert Scale.

The final survey instrument under evaluation thus consists of eighteen items. In 92% of the 138 questionnaires between zero to four answers were missing.

Table 2 summarizes the results of the final instrument. Results show a high level of satisfaction with a total mean score over all items of 4.5 on a 5-point Likert scale. The timeliness of reports is ranked highest with a mean of 4.7. Moreover, professional expertise, communication with the referrers' assistants and other collaborators, information and understandability of reports as well as the possibility to quickly obtain

appointments for patients and reachability of staff scored highly with means of 4.6. On the other hand, referring physicians were not too satisfied concerning the handling of healthcare resources with this item scoring lowest with a mean of 4.2. Likewise, patients' information on examinations, recommendations made in reports concerning additional or future exams as well as the care for vulnerable patients ranged rather low with means from 4.3 to 4.4 (Table 2).

Validity, Internal Consistency and Reliability

High-frequency referrers' mean rankings were higher than those of low-frequency referring doctors with total score means of 4.6 compared to 4.4 respectively. The one-sided Wilcoxon test for differences between rank distributions of high-frequency and low-frequency referrers was significant with a p-value of 0.019 (Figure 1). Concerning the items of the questionnaire, Table 2 shows that for all items, high-frequency referring physicians scored higher than low-frequency referring physicians. The largest differences between means were observed for the questions about the handling of healthcare resources (0.4 points difference) the clinical usefulness and information of reports and whether reports reached referrers timely and the timeliness of getting appointments differed with 0.3 points from high-frequency to low-frequency referring physicians. Also, at an item level, we found significant values of the one-sided Wilcoxon test for eight items. Most of them concerned the radiological report, but also the item about appointment scheduling and the question about handling of healthcare resources showed significant differences with a test result below 0.05. Cronbach's Alpha was 0.96 (95% CI 0.95-0.97) indicating a high degree of internal consistency of items in the survey.

Discussion

The present study aimed to develop a valid, consistent and reliable questionnaire assessing referring physicians' quality-judgments regarding the services provided by outpatient imaging services. The response rate of the questionnaire of almost one third was similar to an earlier study conducted in Switzerland within the context of radiology services [2]. Results revealed that overall referring physicians evaluate the quality of imaging services to be high.

Descriptive statistics showed that especially factors such as timeliness, information and understandability of reports, coordination of appointments as well as communication with referrers' assistants and collaborators reached high scores. It cannot be excluded that these ceiling effects could partially be due to selection bias as participants were already participating in a project aiming at the development of quality indicators.

On the other hand, as answers were anonymous, there was no pressure for referrers to answer positively. Concerning the items that did not yield very high results, there seems to be room for improvement with regard to caring for vulnerable patients, which need special attention and support. Moreover, the quality of recommendations about additional or future radiological examinations and thus the contribution to continuous and sustainable care should be increased.

Validity of the presented questionnaire was assessed by testing for differences between high-frequency and low-frequency referring physicians. Research shows that referrers decide for more or less frequent referrals having in mind their impressions about specialists' medical skills [10, 11, 12, 13, 14, 15, 16, 17]. The tests for differences showed that the questionnaire reproduces these known differences between high-frequency and low-frequency referrers on the level of the total score of the instrument as well as on several items, even if the difference prove to be small.

In accordance with other reports [11, 12, 13, 14, 15, 16, 17, 18], results of the present study revealed the great importance of communication for referrers' quality judgments and decision for or against a certain service. Communication relates to the radiological report, but also to organizational aspects. Considering Hackl et al. [19] who found that referrals within personal networks positively affected patient outcomes, it seems important mentioning that these judgments probably are not only mere subjective 'opinions' but indeed are reliable quality judgments. For radiology services, but also for initiatives encompassing several services, such results can be of great interest, when it comes to planning and implementation of evidence-based quality projects. To carefully design standards for radiological reports, to pay attention to the way a services' staff communicates with referring physicians and their collaborators, to keep organizational aspects up-to-date and well running can be especially important as soon as significant differences appear in comparison between services. Given that the question assessing the handling of healthcare resources was significantly discriminative could be a hint towards the referrers' sensibility to this topic.

However, questions related to patient feedback and medical skills, which also were deemed important, did not seem to yield the same discriminatory potential. For the patient feedback, these results could be due to the fact that, different to other specialists, outpatient radiology services offering mainly diagnostic services are often visited by a patient only once. Feedback is thus probably rather limited to negative experiences. Still, the fact that a number of items concerning patient feedback, like patients' information on examinations, recommendations made in reports concerning additional or future exams as well as the care for vulnerable patients did not range that high in the overall sample should be taken seriously.

Concerning medical skills, the present results could confirm an observation mentioned by Grüber-Grätz et al. [14] before, namely, that if a referring physician would not evaluate the technical and professional skills of a radiology service to be of good quality, patients would not at all be referred to this service. Given that only registered referring physicians participated in this study leads to a selection bias at least to a certain degree.

To the best of our knowledge, so far there has not been a validated questionnaire assessing the quality of outpatient radiology services as judged by referring physicians. Consisting of 18 questions, the final survey instrument is well suited to successfully fulfil its task in due time.

However, we are aware of the following limitations of the present study: first, the number of participants was not high enough to evaluate the questionnaire's potential of discrimination on an item level. This would have given interesting insights in particularly important aspects regarding the quality of outpatient imaging services as evaluated by referrers. Second, a certain selection bias cannot be denied. Answers were only provided by referrers registered as such by the services and not by referrers who might not refer any more to a service, e.g. because of a negative quality judgment. Third, radiology services participating in the study already were part of a larger project about quality and might thus introduce a further positive bias. Furthermore, most of the referring physicians had more than 21 years of professional experience. Even though no significant differences could be found in the ratings between age groups, it might well be that younger referrers have different expectations with radiological services. Finally, the results of this study only apply to outpatient radiology services. Future developments might react to the actual fragmentation of services and foster closer integration of radiology into other diagnostic and treatment processes. Thus, quality assessment instruments might need to be adapted.

The present questionnaire allows to comprehensively evaluate the quality of outpatient radiology services as perceived by their referring physicians. Furthermore, results can be used as basis for quality improvement on an organizational level, for

comparing various services as well as for orchestrating quality initiatives encompassing several services.

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Formatiert: Englisch (Vereinigte Staaten)

Characteristic	N (%)
Imaging Service	
Imaging Service 1	13 (9)
Imaging Service 2	38 (28)
Imaging Service 3	59 (43)
Imaging Service 4	28 (20)
Specialization (multiple selections possible)	
General internal medicine	100
Gynaecology / Obstetrics	10
Orthopedic surgery / traumatology of musculoskeletal system	5
Otorhinolaryngology	5
Rheumatology	5
Pediatry	4
Gastroenterology	3
Physical medicine / rehabilitation	3
Anaesthesiology	2
Neurology	2
Ophtalmology	2
Pneumology	2
Psychiatry and Psychotherapy	2
Other	7
Years since completion of state examination (2 missing answers)	
Less than a year	0 (0)
1-5 years	1 (1)
6-10 years	5 (4)
11-20 years	38 (28)
More than 21 years	92 (67)
Frequency of referral to the imaging services	
More than five times a week (high frequency)	13 (9)

2-5 times a week (high frequency)	56 (41)
Once a week (high frequency)	20 (14)
1-3 times a month (low frequency)	33 (24)
1-3 times a quarter (low frequency)	12 (9)
Less than once a quarter (low frequency)	4 (3)

Table 1. Summary of the study sample's characteristics (n=138).

Tabelle 1. Zusammenfassung der Charakteristiken des Samples (n=138)

	Total		low-frequency referrers (n=49)		high-frequency referrers (n=89)		Exact p-value, Wilcoxon test
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	
Total Score	4.5	0.5	4.4	0.6	4.6	0.5	0.019
Items							
The service's staff is professionally up to date	4.6	0.6	4.5	0.7	4.6	0.5	0.14
The service's staff knows the limits of their competencies and possibilities	4.5	0.6	4.4	0.7	4.5	0.6	0.12
The service's staff informs me if a request for referral exceeds their competencies	4.5	0.8	4.3	0.9	4.5	0.7	0.11
The service's staff cooperates well for the care of patients with complex problems	4.5	0.7	4.3	0.8	4.5	0.6	0.13
The service's staff handles resources for healthcare efficiently (e.g. Elaborate diagnostic procedures)	4.2	0.8	3.9	1.0	4.3	0.7	0.03
I have the impression that service's staff communicates appropriately with my assistants and other collaborators	4.6	0.6	4.5	0.6	4.7	0.5	0.02
Radiological reports contain the expected information	4.6	0.6	4.4	0.8	4.7	0.5	0.02
Radiological reports are comprehensible and clear	4.6	0.6	4.5	0.6	4.7	0.6	0.02
Radiological reports are clinically useful	4.5	0.8	4.3	1.0	4.6	0.6	0.03
Radiological reports contain a clear answer to my question	4.5	0.8	4.3	0.9	4.6	0.7	0.02
Radiological reports contain recommendations based on actual evidence	4.4	0.8	4.3	0.8	4.4	0.8	0.07

for further radiological exams							
I have the impression that the service's staff informs my patients well about the imaging exam.	4.3	0.7	4.2	0.7	4.4	0.7	0.07
I have the impression that the service's staff carefully questions my patients about (e.g. allergies)	4.4	0.7	4.3	0.6	4.5	0.7	0.06
I have the impression that the service's staff treats my patients with understanding and empathy	4.5	0.7	4.4	0.7	4.5	0.7	0.17
I have the impression that very vulnerable patients are also well treated.	4.4	0.7	4.3	0.8	4.4	0.7	0.17
The service's staff can easily be reached	4.6	0.7	4.5	0.7	4.6	0.6	0.13
I get appointments for my patients in due time.	4.6	0.7	4.4	0.8	4.7	0.6	0.007
I receive reports in due time.	4.7	0.6	4.5	0.8	4.8	0.5	0.003

Table 2. Results (mean and standard deviation (SD)) of the 18 items which were included in the final instrument.

Tabelle 2. Resultate (Mittelwertte und Standardabweichung (SD)) der 18 Items des finalen Instruments.